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Availability of
Skilled Manpower Resources
in Ontario
A Review of Information
Available



A Report prepared for the
Royal Commission on Electric Power Planning
Province of Ontario

November 29, 1977



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AVAILABILITY OF
SKILLED MANPOWER RESOURCES IN ONTARIO
A REVIEW OF INFORMATION

AVAILABLE

For

Royal Commission on Electric Power Planning
Ontario

by

Montreal Engineering Company Limited
November 29, 1977

The conclusions presented in
this report do not necessarily
reflect the views of the Royal
Commission on Electric Power
Planning.

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PART ONE

REVIEW OF AVAILABLE INFORMATION

1.0 INTRODUCTION

This report presents a review of work done by others on the availability of skilled construction manpower in Ontario and projections of Ontario Hydro's manpower requirements to 1995. The intent of the review has not been to provide an exhaustive compilation of work in that area, but rather an overall impression of the extent of information that is currently available.

The report is based on literature that has been collected on the subject of manpower availability and discussions with the Ontario Government, the Federal Government, Ontario Hydro and other agencies and associations. The information has been gathered in the context of assessing how the availability of skilled manpower may effect the expansion of the electric power sector in Ontario.

The presentation of this report starts in Part One with a review of the previous testimony on this subject before the Royal Commission on Electric Power Planning, an outline of the general availability of studies that have been (or are about to be) carried out on the subject and a summary of observations made by those with whom this subject was discussed. Part Two presents Ontario Hydro's projections of their manpower requirements to 1995 and Part Three a list of people contacted in the course of the study.

1.1 REVIEW OF PREVIOUS TESTIMONY

During the course of the Hearings on June 2¹ a number of questions were

¹Royal Commission on Electric Power Planning Public Information Hearing:
Volume No. 34, Toronto. June 2, 1976

raised with respect to the planning, recruiting and training of the manpower required for Ontario Hydro's generation expansion plan and the effects on employment of cutbacks in this plan. During this discussion reference was made to a Ministry of Industry and Tourism submission² which provides estimates of the total employment generated in Ontario by the electric power sector. In the course of answering questions, Ontario Hydro stated that they had done sufficient planning for the original expansion program (LRF43P) to feel confident that (i) they had the manpower capability both from a construction trades point of view and from a design point of view to staff the program, and (ii) that the various manufacturing facilities in Canada and abroad had the capability to sustain the program. Hydro also made reference to their recruiting programs with the universities and technical schools and the training programs they carried out themselves.

The projections of the actual number of persons to be employed were not discussed at the Hearing except in the context of the reductions in employment resulting from the cutback in the expansion plan. Hydro's current forecasts of the numbers required for the construction and operation of the generation plan and the methods that will be pursued to meet these requirements are presented in Part Two.

1.2

STUDIES ON THE AVAILABILITY OF SKILLED MANPOWER

Although this review deals mainly with the availability of skilled construction manpower reference is also made to studies on the availability of engineers and the requirements for the manufacturing of

²The Ministry of Industry and Tourism, Submission to the Royal Commission on Electric Power Planning, filed as Exhibit 15 on May 27, 1976

equipment to the extent that data have become available in the course of this study. The conclusions of the reports reviewed on these subjects are summarized below.

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Availability of Construction Manpower

In 1975-76 the Ontario Ministry of Labour³ carried out a pilot survey of union labour supply in construction trades in Ontario with the objectives of improving the data base and methodology for projecting the supply of labour. The study concluded that there were both severe data limitations and, to a lesser extent, problems of choosing a forecasting model which posed questions as to the reliability of the forecasts. The report also concluded that the costs of overcoming these problems relative to the benefits of improving the forecasts brought into question the practicality of continuing the forecasting project. It is understood that these attempts to forecast labour supply have been discontinued.

In Ottawa, the Department of Public Works, in co-operation with other federal departments, is carrying out a study of the feasibility of developing a nationally based Construction Investment Information System. The system would involve the collection of information from investors on their spending programs which would be translated into manpower requirements. These in turn would be compared with manpower supply. It is understood that the feasibility study is recommending that the project should go ahead although it is recognized that there will, as

³Ontario Ministry of Labour Union Labour Supply in Construction Trades in Ontario Results of a Pilot Survey Intended to Improve the Data Base for Making Projections October 1976.

found in the Ontario study, be difficulties in projecting the supply of labour. The system as presently envisaged would be applied to a two to three year planning horizon.

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Availability of Engineering Manpower

On March 2-4, 1977 a conference was held in Edmonton, Alberta on the Utility of Engineering Manpower Planning for Canadian Industry. The conference was sponsored by the following organizations:

Canadian Engineering Manpower Council (CEMC)

Canadian Council of Professional Engineers (CCPE)

Science Council of Canada (SCC)

Engineering Institute of Canada (EIC)

National Research Council (NRC)

The background paper prepared for the conference⁴ presents a bibliography of over 160 entries of books, reports and articles on engineering and skilled manpower planning and a review of ongoing work programs and the involvement in these of various government departments and agencies.

Among those listed as participating in manpower planning (in addition to the sponsors of the conference) were the Department of Manpower and Immigration, the Ministry of State for Science and Technology and Statistics Canada at the federal level and Departments of Education and

⁴Wilson, Andrew H., A Survey of Recent and Current Research in Support of Engineering Manpower Planning, Background Paper for Conference on: The Utility of Engineering Manpower Planning for Canadian Industry, Edmonton, Alta. March 2-4, 1977

Labour at provincial levels. Among the non-government organizations the Technical Service Council was included as a regular contributor on the state of the market for technically qualified manpower.

In 1975 the Technical Service Council sponsored a study⁵ which projected the demand and supply of graduates in engineering, chemistry, business and commerce to 1985 and a second study in 1976⁶ on the demand and supply of graduates in engineering. The general conclusion of these studies was that the supply of new graduates in engineering will be greater than the demand for this period but the authors acknowledge that their methods of analysis are subject to many limitations.

123

Capacity of Manufacturing to Supply Equipment

In 1974 a study was carried out by the Department of Industry, Trade and Commerce⁷ on the Canadian manufacturing and engineering industry capability to meet the projected requirements of the CANDU program for the domestic and export market to 1983. The report concluded that the industry had the "technical know-how to cope with the unique requirements of the CANDU program" but that significant expansion of facilities

⁵Harvey, Edward B., and Murthy, K.S.R., Supply of and Demand for New Graduates in Engineering, Chemistry, Business and Commerce, Technical Service Council, Toronto, 1975.

⁶Harvey, Edward B., and Murthy, K.S.R., Engineering Manpower, Demand and Supply: Further Estimates, Technical Service Council, Toronto, 1976.

⁷Department of Industry Trade and Commerce in association with Atomic Energy of Canada Limited and the Department of Energy Mines and Resources Canadian Nuclear Industry Study March 1975.

would be required to meet the projected demand of six units per year.

With respect to the associated requirement of equipment and engineering service for heavy water plants the report concluded that adequate capacity existed in Canada to meet the requirement.

1.3 OBSERVATIONS FROM INTERVIEWS

In addition to the review of these reports discussions were carried out with a number of people involved in manpower planning as listed in Part Three. The following summarizes some of the points made by those contacted:

- (i) The supply of skilled labour is generally not envisaged as a constraint to the development of large projects. This was essentially the unanimous viewpoint of those with whom this was discussed in Toronto but in Ottawa, as the pursuit of additional studies indicate, labour availability was seen by some as a possible bottleneck. This difference in viewpoint follows in part from the fact that large projects in Ontario are probably better defined (and in the case of Hydro, training programs are underway) whereas on the national level projects such as the pipelines are not part of a continuous program and their timing is not known.
- (ii) It was observed by several that although there would be little problem in attracting construction labour for large projects because of attractive wages, and in many cases the assurance of fairly long term employment, there has been, and will continue to be, a detrimental effect on the manufacturing sector where wages tend to be lower.

(iii) One of the problems noted as difficult to come to grips with in manpower planning was assessing the mobility of the labour force. This was thought to be more a problem on the national level rather than on the provincial level and in most instances a function of the onsite facilities and living allowances offered by the projects.

1.4

FINDINGS

The findings of this review are as follows:

- (i) There are no long term forecasts of either the demand for, or supply of the total skilled construction manpower in Ontario and at present little likelihood that such forecasts will be prepared.
- (ii) Studies that have been prepared on the availability of skilled manpower do not envisage manpower availability as a constraint to the development of large projects, although there has been, and will continue to be, a detrimental effect on manufacturing where wages tend to be lower.

PART TWO

ONTARIO HYDRO'S LABOUR
REQUIREMENTS

This part of the report presents forecasts of Ontario Hydro's requirements for specific construction skills and trades and their total manpower requirements. The forecasts, which have been prepared by Ontario Hydro¹, are based on projected load growth of approximately 6 per cent per annum, a high nuclear (66%) generation mix in the east system and no nuclear in the west system. The forecasts are for direct employment only and do not include employment in any of the manufacturing industries that supply Ontario Hydro.

Ontario Hydro's projected construction manpower requirements are shown in Table 2-1 by trade for the period 1977 to 1997. As the Table shows the 1977 requirements of 12,480 is projected to almost triple to 36,411 over the 20 year period. In terms of an average annual rate of increase this is equivalent to 5.5%/annum. The skills with the largest increases in requirements are carpenters, millwrights, electricians, steam and pipefitters, camp staff trades and engineering.

These construction trade requirements are normally recruited through union halls. Professional staff are hired either directly from educational institutions or are recruited from the labour market. Ontario Hydro anticipates it will be increasingly necessary to train their staff rather than obtaining trained people from the labour market. Accordingly, plans are in place to develop personnel for such assignments. In the case of specific trades where shortages are forecast, off-the-job training classes are held.

¹The material presented here on Ontario Hydro's forecasts and their recruitment policies has been drawn from the draft report Ontario Hydro Manpower Predictions November 1977 and from material prepared by Ontario Hydro for this study in April 1977.

TABLE 2-1

TOTAL CONSTRUCTION TRADES AND STAFF REQUIREMENTS
(for 1977 to 1997 Generating Stations, Heavy Water Plants and
Stations, Transmission and Distribution)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Boilermakers.	407	425	465	566	510	452	392	466	640	475	399
Bricklayers	23	33	29	34	21	21	22	20	22	22	22
Cement Masons	74	56	52	58	55	46	50	93	113	111	111
Carpenters, Millwrights	958	1232	1262	1271	1275	1345	1350	1622	1908	1898	1784
Electricians.	1166	1231	1476	1460	1603	1729	1882	1897	1773	2090	2174
Insulators.	281	164	156	153	132	147	129	172	131	182	321
Ironworkers, Rodmen	466	537	681	603	601	605	598	755	832	753	776
Labourers	1366	1698	1592	1353	1369	1546	1686	1970	2188	2207	2039
Operators, Mechanics & Machinists, Firefighters	589	755	796	683	692	675	737	870	953	1038	1022
Steam & Pipe Fitters.	1810	1390	1494	1458	1399	1285	1553	1622	1746	2376	2529
Sheet Metal Workers	127	66	57	77	78	89	81	123	104	96	120
Teamsters	484	707	632	601	655	643	660	863	842	806	936
Painters and Glaziers	111	97	134	140	130	152	145	156	133	191	162
Camp Staff Trades	138	149	156	219	324	456	655	904	987	1013	1094
Hydro Staff	1230	1314	1320	1463	1546	1719	1779	1876	2195	2362	2280
Engineering Staff	2710	2772	3049	3383	3401	2999	3110	3414	4010	4143	4479
Linemen	309	429	349	327	400	419	508	500	427	477	566
Groundmen	204	333	272	254	311	326	395	389	332	371	440
TOTAL . . .	12480	13388	13972	14103	14502	14654	15732	17712	19336	20611	21254

TABLE 2-1 (continued)

TOTAL CONSTRUCTION TRADES AND STAFF REQUIREMENTS
 (for 1977 to 1997 Generating Stations, Heavy Water Plants and
 Stations, Transmission and Distribution)

	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
Boilermakers	516	609	733	602	553	633	782	997	978	831
Bricklayers.	24	25	26	29	29	33	33	35	35	37
Cement Masons.	78	130	135	129	150	139	130	186	202	175
Carpenters, Millwrights.	1828	2119	2560	2286	2364	2416	2551	3120	3104	3174
Electricians	2016	2018	2407	2635	2731	2764	2761	3002	3332	3466
Insulators	213	142	120	214	391	230	173	193	258	549
Ironworkers, Rodmen.	825	888	1064	1038	951	1061	1080	1284	1351	1309
Labourers.	1997	2305	2867	2768	2649	2583	2828	3478	3693	3480
Operators, Mechanics & Machinists, Firefighters. . .	937	1082	1307	1243	1277	1260	1376	1531	1748	1660
Steam and Pipe Fitters	2191	1934	2215	2962	3077	2723	2576	2915	3761	4140
Sheet Metal Workers.	116	140	104	135	180	130	155	171	210	218
Teamsters.	900	831	1190	1126	1058	1214	1292	1362	1435	1501
Painters and Glaziers.	160	167	197	244	188	228	321	223	306	264
Camp Staff Trades.	1334	1566	1574	1495	1694	1865	1893	1904	2119	2288
Hydro Staff.	2127	2377	2732	2667	2898	2886	2943	3459	3712	3795
Engineering Staff.	4611	4945	5429	5810	6032	6065	6629	6879	7413	7837
Linemen.	563	543	693	676	716	778	789	828	857	949
Groundmen.	438	422	539	525	556	605	614	644	667	738
TOTAL . . .	20874	22244	25892	26584	27494	27613	28926	32211	35181	36411

SOURCE: Ontario Hydro (Expansion Schemes E-LI-HN 850-25 and W-LI-NN 200-40)

2.2 OPERATION AND MAINTENANCE

The operation and maintenance staff required to man the expanding system is projected to grow at a rate similar to the construction requirements. The operation and maintenance requirements in 1975 totalled 5,403 and are projected to reach 15,255 by 1995. Approximately 40% of the existing requirements are for conventional thermal plants and the remaining 60% are for the operation and maintenance of nuclear plants. By 1995 the nuclear portion is projected to reach approximately 70% of the total, or about 10,000.

The distribution of the operation and maintenance labour force for the nuclear plants is as follows:

Professional	10%
Technical and non-technical support	10%
Plant Operators	30%
Administration Services	20%
Mechanical Trades	
Fitters	9%
Machinists	2%
Pipe Fitters	2%
Welders	<u>2%</u>
Sub Total	15%
Control Trades	
Electricians	6%
Electronic	5%
Instruments	3%
Computer	<u>1%</u>
Sub Total	<u>15%</u>
TOTAL	100%

The distribution of requirements are similar for the thermal plants.

The operators, mechanical and control trades, management and professionals are normally divided into four or more levels of skill requirements. Recruiting

is usually done from educational institutions for people at the first level and from the labour market for partially trained people into the intermediate levels. The training, which is done largely by Ontario Hydro, takes from four to eight years from the bottom to top level.

Ontario Hydro's recruiting and training program has been formulated on the premise that they will have increasing difficulty in finding partially skilled people. Typically the recruits for nuclear plants enter their Nuclear Training Centre for the first five to nine months and then receive further closely supervised on-the-job and plant classroom training at nuclear stations. Similarly, recruits for thermal plants attend the Thermal Training Centre.

2.3 REGIONS AND MARKETING AND ADMINISTRATION STAFF REQUIREMENTS

The Regions and Marketing and Administration requirements are forecast to increase at more modest rates over the next 20 years than the requirements for construction and operation. The Regions and Marketing staff is projected to increase 23% from the 1975 level of 6,159 to the 1995 level of 7,566 and Administration is forecast to increase 75% from 6,317 in 1975 to 11,044 in 1995.

2.4 ONTARIO HYDRO'S TOTAL REQUIREMENTS AND THE LABOUR FORCE IN ONTARIO

Ontario Hydro's total projected manpower requirements are summarized in Table 2-2 for the period 1975 to 1995. In 1975 the total of 28,730 represented approximately 0.7% of the total labour force of 3,857,000 in the Province. Ontario Hydro construction requirements of 10,851 in 1975 represented about five per cent of the construction labour force in the province².

²The provincial construction labour force represents approximately 6% of total labour force and was 225,000 in 1974. Ibid Ministry of Industry and Tourism.

TABLE 2-2

SUMMARY OF FORECASTS OF ONTARIO HYDRO'S MANPOWER REQUIREMENTS

		1975	1980	1985	1990	1995	Percent Increase 1975 to 1995 (%)
Construction	10851	14103	19336	25892	32211	397	
Operation & Maintenance	5403	7973	10051	12322	15255	182	
Regions and Marketing	6159	7235	7400	7500	7566	23	
Administration	6317	7262	8351	9604	11044	75	
TOTAL	28730	36574	45138	55318	66076	130	

It is difficult to relate Ontario Hydro's projections to 1995 to any provincial totals at that time because of the general lack of forecasts of the labour force. However, taking the Statistics Canada population forecast³ for the 15 to 65 year age group for this period as an indication, the labour force could grow of the order of two per cent per annum. Since Ontario Hydro's total requirements are growing at 4.3 per cent per annum and the construction and O & M at 5.5 per cent per annum it is evident that their direct employment, particularly in the construction industry, will have an increasingly important role in the Province's economy.

³ Statistics Canada. Catalogue 91-514. The forecast based on medium fertility (Projection B) is for an average increase of 1.7 per cent per annum in the 15-64 age group from 1975-95. If the participation rate does not change then the labour force will tend to parallel this rate or to exceed it if the participation rate increases. If the female participation rate increased from the present level of 52% to 70% of the rate of growth in the labour force would increase to 2.3 percent per annum.

PART THREE
LIST OF PERSONS CONTACTED

LIST OF PERSONS CONTACTED

J. Dicaire, Canadian Council of Professional Engineers, Ottawa

J.D. Barclay, Manpower Directorate Planning, Manpower Employment Services Branch, Manpower and Immigration, Government of Canada

W.A. Ledingham, P.Eng., Sr. Policy Co-ordinator, Strategic Planning Branch, Government of Ontario, Toronto

N.A. Macdougall, General Manager, Technical Service Council, Toronto

R.T. Matsunaga, Senior Manpower Planning Analyst, Manpower Planning Department, Ontario Hydro, Toronto

G.M. McHenry, General Manager - Personnel, Ontario Hydro, Toronto

W.J. Patterson, Manager, Manpower Planning Department, Ontario Hydro, Toronto

G.R. Sigaty, Policy Research Officer, Policy Research Group, Public Works Dept., Government of Canada

M.L. Skolnik, Director, Research Branch, Ministry of Labour, Government of Ontario, Toronto

R.B. Royiwsky, Manpower Planning Analyst, Manpower Planning Department, Ontario Hydro, Toronto

The Availability of Skilled Manpower

The following are additions to the study, entitled "Availability of Skilled Manpower", commissioned by RCEPP to Montreal Engineering Company, Limited.

Part I - Review of Available Information

1. The review of previous testimony is now an on-going process done by staff of RCEPP ; current addditions to those transcripts cited by the Montreal Engineering Company, Limited, include:

a) Demand Hearings:

Employment - effect of energy conservation
E67-2:17-19, T98:12224-12225,
12246, 12247-12251, E86:21-24,
T109:13535-13537, 13571-13579;

b) Conventional, Alternate Hearings:

Employment - jobs created by use of renewable energy T121:15198-15199, T121:15223-15224, E133, Part I & II;

c) Financial, Economic Hearings:

Employment - Huron County Federation of Agriculture: relationship between energy and employment E183:1, T148:19522-19524
amount of employment, solar vs. nuclear T148:19524-19525
jobs gained by renewable sector T148:19611-19619
Ontario Hydro: use to help unemployment rates T149:19770, 19774-19775
in Britain T149:19772-19773, 19775-19778
in construction of generating

stations T149:19818-19829
Bernstein: Ontario Hydro as
employment tool T150:20263-

2. Further, in enumerating the studies currently underway in the manpower field, the following sources of information can be included for reference by a reader:

- "Labour Market Information Programme", Ministry of Labour - Research Branch, Ontario;
- Canadian Occupational Forecasting Program, No.7, Ontario, Occupational demands to 1982, including construction trade;
- O.M.C.C. (Ontario Manpower Coordinating Committee);
- Canadian Immigration Policy;
- Labour Mobility Programmes. (\$2.1 million in 1976-77 for Ontario);
- M.N.C. Manpower Needs Committee;
- F.O.I.L. (Manpower, Immigration - Ottawa), forward occupational imbalance ledger, 2 yr. judgemental assessment.

3. Where, on p.1-6, the study indicates that large projects in Ontario are better defined and, hence, cause less problems in supplying skilled labour, reference should be made to a brief submitted by the Construction Labour Relations Association of Ontario, entitled "A Brief to the Industrial Inquiry Commission into Bargaining Patterns in the Construction Industry in Ontario", which includes the following statement:

"(5) THE MAJOR UPSETTING PROJECT

Ontario doesn't have any single project of the magnitude of the James Bay hydro-electric installation, but it does have several which come under the category of major upsetting projects -- such as the various Ontario Hydro installations around the province, the Nanticoke development, the Texasmelt Sulphur smelter in Timmins and the petrochemical development in Sarnia.

These multi-million dollar projects are of such magnitude that they completely dominate the local construction scene and lead to unhealthy bargaining situations for local contractors. Usually, such major projects pick up local rates and conditions, with some fringe benefits being established especially for the upsetting project. Most major projects have no-strike, no-lockout agreements with the trades as well." (p.11). "

Part II - Ontario Hydro's Labour Requirements

1. The study presents forecasts of Ontario Hydro's man-power requirements for construction skills and trades.

The following Ontario Hydro documents can supplement this section:

"Ontario Hydro Summary of Selected Manpower Planning and Forecasting Activities, April, 1977."

Paper prepared by W.J.Patterson, Manager, Manpower Planning Department of Ontario Hydro. Designed to answer the question: "For the current LRF-48a Program, could you indicate the current and forecasted recruitment of necessary manpower?".

"Manpower Requirements" - a paper prepared as background material for the Seminar on "Energy, Jobs and the Economy" held by RCEPP on December 5, 1977.

List of Participants of the above Seminar.

With regard to the stated opinion of Ontario Hydro concerning the necessity as seen by Hydro to train their own staff:

"Ontario Hydro anticipates it will be increasingly necessary to train their staff rather than obtaining trained people from the labour market. (p.2-1).

and also Hydro's difficulty in obtaining partially skilled people:

"Ontario Hydro's recruiting and training program has been formulated on the premise that they will have increasing difficulty in finding partially skilled people."

reference should be made to the pending meeting of February 13, 1978, between the Deans of Technology of the Colleges of Ontario and the manpower personnel of Ontario Hydro, scheduled to discuss this particular dilemma.

Finally, on the final page of the study, the question of the growth in the size of the labour force in Canada is dealt with. In contrast to the figures used in the the Montreal Engineering Study, in-depth results of the population seminar held at RCEPP indicate a slow down in the growth of the labour force. Reference should be made to the final report of the population seminar.

Part III - List of Persons Contacted

When pursuing the topic of manpower planning in the energy field, the list of invited guests to the RCEPP seminar, entitled "Energy, Jobs and the Economy - Labour's Viewpoint", can be considered a good beginning at locating personnel in the Province of Ontario involved in the process of manpower planning.

ONTARIO HYDRO
SUMMARY OF SELECTED MANPOWER
PLANNING AND FORECASTING ACTIVITIES
APRIL 1977

A. OPERATIONS AND MAINTENANCE

1. Thermal (Fossil Fuel)

Period of forecasting requirements - ten years

Magnitude of Demand

Present population base	- 2,300	(as of Dec. 31/76)
Projected population base	- 3,500	

Method of recruiting and training.

The Mechanical Shift Maintainer, Electrical and Instrumentational Shift Maintainer trades, Thermal Operator and Management and Professional populations are divided into four or more levels of skill requirements. Entry into each of these populations is either through recruiting people with no relevant skills other than specified academic qualifications, or recruitment of partially skilled people into the appropriate intermediate level. The total time from bottom to top level is of the order of four to eight years, depending upon the population. By and large, these people must be trained wholly or partially by Ontario Hydro because of the leading edge nature of much of the technology required.

We forecast an increasing difficulty in recruiting partially skilled people; and our recruiting and training plans take this into account. Inexperienced recruits are inducted through Ontario Hydro's Thermal Training Centre, then assigned to specific thermal generating stations where they are trained in the required skills through closely supervised on-the-job and plant classroom training. As required, they attend the Thermal Training Centre for intensive classroom and laboratory training to supplement station training.

2. Nuclear

Period of forecasting requirements - ten years

Magnitude of Demand

Present population base	- 3,300 (as of Dec.31/76)
Projected population base 1966	- 6,600

Method of recruiting and training.

The Nuclear Operator, Shift Mechanical Maintainer, Shift Control Technician, Chemical Operator, and Management and Professional populations are divided into four or more levels of skill requirements. Entry into each of these populations is either through direct resourcing from graduating classes of educational institutions or recruitment of partially skilled people into the appropriate intermediate level. The total time from bottom to top level is of the order of four to eight years, depending upon the population. By and large, these people must be trained wholly or partially by Ontario Hydro because of the leading edge nature of much of the technology required.

We forecast an increasing difficulty in recruiting partially skilled people; and our recruiting and training plans take this into account. Typically, recruits are inducted into Ontario Hydro's Nuclear Training Centre and remain for five to nine months of classroom and laboratory training. They are then assigned to specific Nuclear Generating Stations where they are trained in the required skills through closely supervised on-the-job and classroom training.

B. CONSTRUCTION ACTIVITIES
(Thermal and Nuclear Generating Stations)

Period of forecasting requirements - five years.

Magnitude of Demand

Present population base	-	6,800	(as of Dec. 31/76)
Projected population base 1981	-	8,500	

Method of recruiting and training.

All construction trades are normally recruited through Union halls. Field Technician, Management, and Professional people are either hired through direct resourcing from graduating classes of educational institutions, or are recruited with the appropriate skills directly from the labour market to meet current job requirements. We forecast that it will be increasingly necessary in the future to train most of Ontario Hydro's construction staff rather than obtaining trained people from the labour market. Accordingly, Ontario Hydro has in place plans to progress selected management and professional people through supervised job responsibilities to develop them for future assignments. In specific trades where shortages of numbers of skills are forecast, off-the-job training classes are held eg. welders and pipe fitters.



700 University Avenue, Toronto, Ontario M5G 1X6

December 9th, 1977

Mr. Ronald C. Smith
Executive Director
Royal Commission on Electric
Power Planning
7th Floor
14 Carlton Street
TORONTO, Ontario
M5B 1K5

Dear Mr. Smith:

In reviewing our submission to your group, it appears that some ambiguity could arise about the nature of our Manpower Planning Projections. I would like to clarify them at this time.

The numbers generated represent work done on one of the 90 hypothetical expansion program alternatives under consideration in Ontario Hydro's System Expansion Program Reassessment. The scenario you have, closely resembles Ontario Hydro's official long range expansion plan LRF48A, but different assumptions have been made.

The numbers are the best available for giving you some indication for our long range manpower demands. If you have any questions about the submission, please do not hesitate to call.

Sincerely,

W.J. Patterson
Manager
Manpower Planning Department

DEC 19 1977

1. Question

For the current LRF - 48a Program, could you indicate the current and forecasted recruitment of necessary manpower?

Answer

In response to your request on manpower requirements for LRF-48a, we have provided you with our latest System Expansion Program Review manpower forecasts. These figures go beyond the LRF-48a figures but are compatible with it.

For the purposes of this report, we will consider only the case with the assumptions -

- approx. 6.25% load growth
- east system - high nuclear (66%) generation mix with 850 megawatt additions to maintain a 25% reserve.
- west system - no nuclear generation mix with 200 megawatt additions to maintain a 40% reserve.

The curve of load growth vs. time is shown in Figure 1. and the actual managed firm load figures are shown in Table 2.

Prepared by:

Manpower Planning Dept.

FIGURE 1

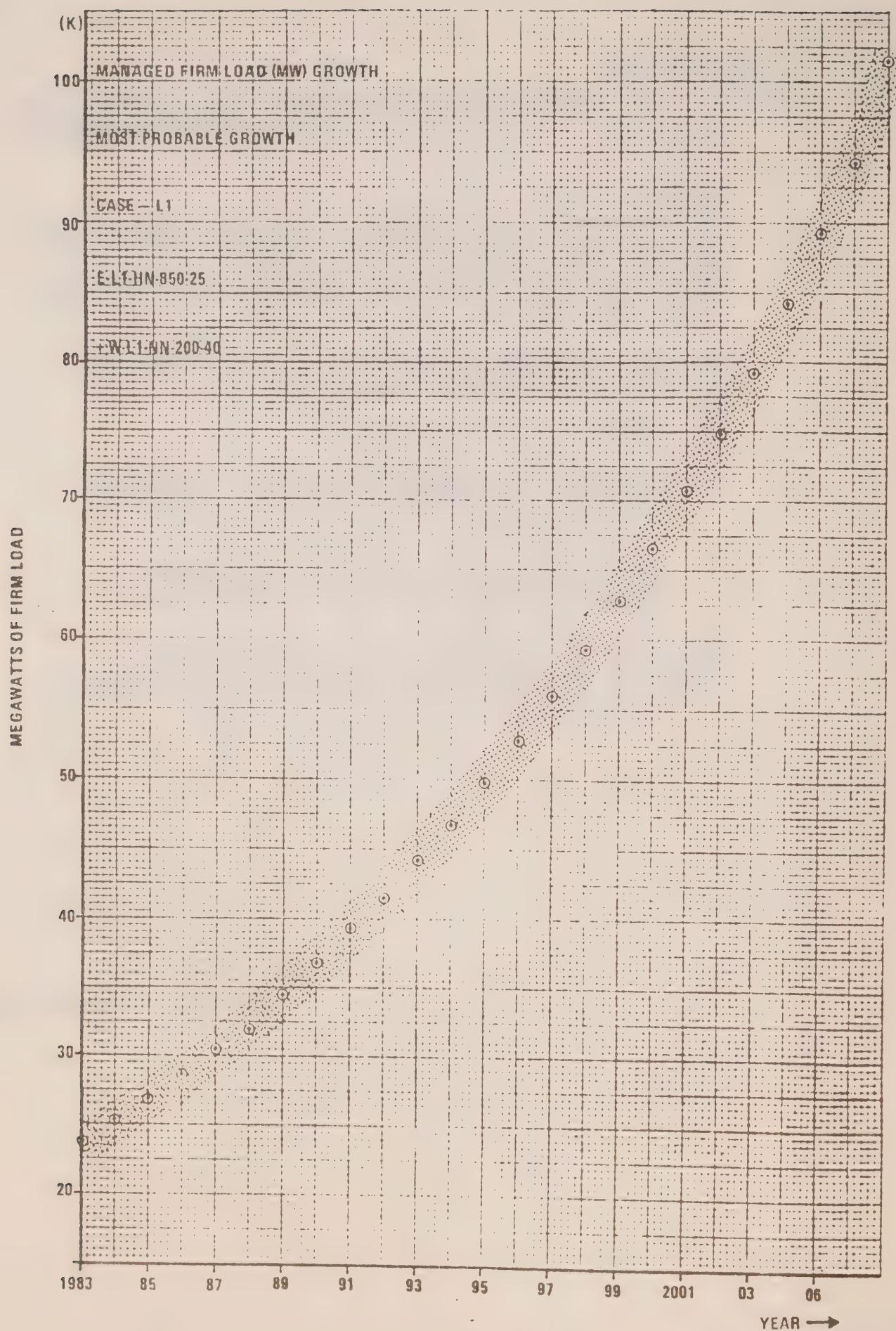


TABLE 2
 MANAGED FIRM LOAD BY YEAR
 Case: E-L1-HN-850 + W-L1-NN-200-40

<u>Year</u>	<u>Managed Firm Load (MW)</u>
1983	23,740
1984	25,217
1985	26,834
1986	28,590
1987	30,439
1988	32,399
1989	34,476
1990	36,678
1991	39,013
1992	41,483
1993	44,102
1994	46,871
1995	49,804
1996	52,809
1997	55,965
1998	59,313
1999	62,855
2000	66,611
2001	70,604
2002	74,838
2003	79,327
2004	84,086
2005	89,132
2006	94,480
2007	100,151

II

MANPOWER DEMAND

In order to review the manpower demand situation it is necessary to set up a framework in which to consider possible scenarios.

The first and most important definition is the kinds of skills or trades which we will be considering. The basic set of Skill and Trade categories used for this study are displayed in Table 3.

A. Construction Manpower

The methodology in projecting construction manpower demand is quite simple. Essentially, a historical profile of demand for

- Generating Stations
- Stations, Transmission and Distribution
- Heavy water plants

is used in conjunction with the projected construction schedule. The manpower profiles for constructing the generating stations are superimposed and added cumulatively to generate the demand by trade category.

There is a different profile used for

- Nuclear Stations
- Fossil Stations

Because the historical profiles may be based on projects of sizes other than those planned, or being considered, scaling factors are used to adjust the requirements.

TABLE 3

CONSTRUCTION SKILL AND TRADE CATEGORIES

1. Boilermakers
2. Bricklayers
3. Cement Masons
4. Carpenters, Millwrights
5. Electricians
6. Insulators
7. Ironworkers, Rodmen
8. Labourers
9. Operators, Mechanics and Machinists, Firefighters
10. Steam and Pipe Fitters
11. Sheet Metal Workers
12. Teamsters
13. Painters and Glaziers
14. Camp Staff Trades
15. Hydro Staff
16. Engineering Staff
17. Linemen
18. Groundmen

TABLE 4

TOTAL CONSTRUCTION TRADES AND STAFF REQUIREMENTS FOR
 E-LI-HN850-25, W-LI-HN800-40, H.M.P.'s
 Includes Generating Stations, H.M.P.'s & ST & D

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Boilermakers	407	425	465	566	510	452	392	466	640	475	399
Bricklayers	23	33	29	34	21	21	22	20	22	22	22
Cement Masons	74	56	52	58	55	46	50	93	113	111	111
Carpenters, Millwrights	958	1232	1262	1271	1275	1345	1350	1622	1908	1898	1784
Electricians	1166	1231	1476	1460	1603	1729	1882	1897	1773	2090	2174
Insulators	281	164	156	153	132	147	129	172	131	182	321
Ironworkers, Rodmen	466	537	681	603	601	605	598	755	632	753	776
Labourers	1366	1698	1592	1353	1369	1546	1686	1970	2188	2207	2039
Operators, Mechanics & Mechanics, Firefighters	589	755	796	683	692	675	737	870	953	1038	1022
Steam & Pipe Fitters	1810	1390	1494	1458	1399	1285	1553	1622	1746	2376	2529
Sheet Metal Workers	127	66	57	77	78	89	81	123	104	96	120
Teamsters	484	707	632	601	655	643	660	863	842	806	936
Painters and Glaziers	111	97	134	140	130	152	145	156	133	191	162
Camp Staff Trades	138	149	156	219	324	456	655	904	987	1013	1094
Hydro Staff	1230	1314	1320	1463	1546	1719	1779	1876	2195	2362	2280
Engineering Staff	2710	2772	3049	3383	3401	2999	3110	3414	4010	4143	4479
Linemen	309	429	349	327	400	419	508	500	427	477	566
Groundmen	240	333	272	254	311	326	395	389	332	371	440
tot	12480	15383	13972	14103	14502	14654	15732	17712	19336	20611	21254

TABLE 4

	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
Boilermakers	516	609	733	602	553	633	782	997	978	831
Bricklayers	24	25	26	29	29	33	35	35	35	37
Cement Masons	78	130	135	129	150	139	130	106	202	175
Carpenters, Millwrights	1828	2119	2560	2286	2364	2416	2551	3120	3104	3174
Electricians	2016	2018	2407	2635	2731	2764	2761	3002	3332	3466
Insulators	213	142	120	214	391	230	173	193	258	549
Ironworkers, Foundrymen	825	888	1064	1038	951	1061	1080	1284	1351	1309
Labourers	1997	2305	2867	2768	2649	2583	2828	3478	3693	3440
Operators, Mechanics & Machinists, Firefighters .	937	1083	1307	1243	1277	1260	1376	1531	1748	1660
Steam and Pipe Fitters	2191	1934	2215	2962	3077	2723	2576	2915	3761	4140
Sheet Metal Workers	116	140	104	135	180	130	155	171	210	218
Teamsters	900	831	1190	1126	1058	1214	1292	1362	1435	1501
Painters and Glaziers	160	167	197	244	188	228	321	223	306	264
Camp Staff, Trades	1334	1566	1574	1495	1694	1865	1893	1904	2119	2286
Hydro Staff	2127	2377	2732	2667	2898	2886	2943	3459	3712	3795
Engineering Staff	4611	4945	5429	5810	6032	6065	6629	6879	7413	7837
Linemen	563	543	693	676	716	778	789	828	857	949
Groundmen	438	422	539	525	556	605	614	644	667	738
Total	20874	22244	25892	27494	27613	28926	32211	35181	36411	

B. Operating and Maintenance Manpower

1. Nuclear

The methodology for generating the operating and maintenance manpower is quite straightforward. Using historical information, we have available staff profiles for operating and maintaining a 4 unit 850 megawatt nuclear generating station and the same profiles for a site (A site includes a heavy water and bulk steam plant). These profiles show the bulk numbers (totals) of people required by year.

The breakout of operating and maintenance manpower by skill/trade category and year is shown in Table 9.

2. Thermal

The methodology used in the calculation of the Thermal operating and maintenance staff is similar to that used for nuclear. Table 13 shows the Thermal operating and maintenance staff broken out by trade and year.

3. Regions and Marketing

The methodology for regions and marketing was simple. This was required because of the shortage of data and the lack of time to do a detailed analysis of how operating and maintenance staff varied with generated capacity. Several factors which could dramatically affect the projections were not part of the analysis. Factors such as rural customers served, and length and size of transmission lines were not dealt with.

TABLE 9

NUCLEAR OPERATING & MAINTENANCE
 STAFF REQUIREMENTS
 ELL-HN-850-25 & HWP's
 WL1-NN-200-40

Categories	Conversion Factor	19 77	19 78	19 79	19 80	19 81	19 82	19 83	19 84	19 85
Professional	10							121	156	195
Tech & Tech Support	10							121	156	195
Plant Operators	30							363	469	585
Admin. & Services	20							242	313	390
Mech. Trades	15							181	235	292
Control Trades	15							181	235	292
TOTAL	100	19	150	304	429	644	923	1204	1564	1949

TABLE 9

**NUCLEAR OPERATING & MAINTENANCE
STAFF REQUIREMENTS
EL1-HN-850-25 & HWP's
WL1-NN-200-40**

TABLE 13

THERMAL OPERATING & MAINTENANCE STAFF REQUIREMENTS

Category	Conversion Factor	1983	1984	1985	1986	1987	1988	1989	1990	1991
Administration	11	21	34	41	51	61	74	90	102	112
Operating	34	64	106	128	155	188	228	279	317	347
Mechanical Mtce.	16	30	50	60	74	89	107	131	150	163
Technical	3	6	9	11	14	17	20	25	28	31
Chemical	3	6	9	11	14	17	20	25	28	31
Service Mtce.	22	42	68	83	101	122	147	180	208	224
Electrical & Instrumentation Mtce.	11	21	34	41	51	61	74	90	102	112
TOTAL	100	190	310	375	460	555	670	820	935	1020

TABLE 13 Continued

THERMAL OPERATING & MAINTENANCE STAFF REQUIREMENTS
 ELL-HN-850-25
 WLL-NN-200-40

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
123	136	153	174	200	216	234	254	270	304	325	352	
383	422	474	554	619	666	793	783	832	938	1006	1086	
180	198	224	261	291	314	340	369	392	442	474	510	
34	38	42	49	55	58	63	69	73	82	89	96	
34	38	42	49	55	58	63	69	73	82	89	96	
248	272	307	359	400	432	468	507	540	608	652	704	
123	136	153	179	200	216	234	254	270	304	325	352	
TOTAL	1125	1240	1395	1630	1830	1960	2125	2305	2450	2700	2900	3196

The basis for our projections came from 1974 through 1977 historical figures showing total staffing for Regions and Marketing by trade category. In addition, projections up to 1980 were available.

Using 1977 as a base year, we assumed that the proportionate distribution of staff would remain stable for the time horizon to 2005. In order to get useable staff categories, some aggregation of the existing trades was required. The resulting distribution and forecast is shown in Table 18.

TABLE 18

REGIONS AND MARKETING MANPOWER PROJECTION

<u>Year</u>	<u>Manpower</u>	<u>Year</u>	<u>Manpower</u>
1974	6911	1990	7500
1975	6844	1991	7515
1976	6809	1992	7525
1977	7006	1993	7540
1978	7096	1994	7555
1979	7181	1995	7566
1980	7235	1996	7580
1981	7280	1997	7590
1982	7315	1998	7600
1983	7350	1999	7610
1984	7375	2000	7620
1985	7400	2001	7630
1986	7425	2002	7640
1987	7445	2003	7645
1988	7465	2004	7655
1989	7480	2005	7665

SUMMARY

This manpower planning report describes a basic methodology for projecting human resource requirements over the next 20 years. We have limited this particular study to one projection, based on the most probable SEPR scenario (ELL-HN-850-25; WL1-NN-200-40). Although time has not permitted any detailed analysis, we will put down some first impressions based on the summary data available from our projections.

In looking at our total manpower growth summaries (table 19), we can see that the demand for manpower by Ontario Hydro will double by 1990 from the status at 1975. This means that over the next 15 years, we will have the equivalent of another present day Ontario Hydro. We should keep in mind that the original present day Hydro took 70 years to build up. This shows both an accelerated increase in manpower requirements as well as indicating some potential management problems ahead.

If we look in slightly more detail at the gross types of manpower and how they will vary over the 1975-1995 time period, we will see that:

- The construction manpower requirements will triple.
- The need for operating and maintenance staff will almost triple.
- In the Regions, there will be a 23 per cent increase in manpower requirements.
- In administration, there will be a 75 per cent increase in staff requirements.

TABLE 19

S.E.P.R. MANPOWER SUMMARY

	<u>1977</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Construction	10851	14103	19336	25892	32211
O & M	5403	7974	10051	12322	15255
Regions	6159	7235	7400	7500	7566
Administration	<u>6317</u>	<u>7262</u>	<u>8351</u>	<u>9604</u>	<u>11044</u>
TOTAL	<u>28730</u>	<u>36574</u>	<u>45138</u>	<u>55318</u>	<u>66076</u>
<u>Growth as a % of 1977 Manpower 1977 = 100</u>					
Construction	100	130	178	239	297
O & M	100	148	186	228	282
Regions	100	117	120	122	123
Administration	<u>100</u>	<u>115</u>	<u>132</u>	<u>152</u>	<u>175</u>
TOTAL	<u>100</u>	<u>127</u>	<u>157</u>	<u>193</u>	<u>230</u>

TABLE 19 Continued

RELATIVE % GROWTH OVER 5 YR PERIODS

	<u>1977</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Construction	100	30	37	34	24
O & M	100	48	26	23	24
Regions	100	17	02	01	01
Administration	<u>100</u>	<u>15</u>	<u>15</u>	<u>15</u>	<u>15</u>
TOTAL	<u>100</u>	<u>27</u>	<u>23</u>	<u>23</u>	<u>19</u>

Manpower Distribution

	<u>1977</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Construction	38	38	43	47	49
O & M	19	22	22	22	23
Regions	21	20	16	14	11
Administration	<u>22</u>	<u>20</u>	<u>19</u>	<u>17</u>	<u>17</u>
TOTAL	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

The administration figure should only be taken as an estimate. Because no figures were available on growth in this area, we assumed a 15 per cent growth rate every five years. Further, it should be understood that the administration sector includes all of the support staff required within Ontario Hydro.

The Regions' growth was based on a historical projection. With no firm data available, we believe that a 3 per cent growth rate (rather than 1 per cent) is not impossible or unreasonable. The projection of this assumption would show a 74 per cent growth rather than the 23 per cent indicated.

2. Question

To what extent do you expect future employees to come out of recognized universities and colleges in Ontario?

Answer

~~My~~ Estimates are as follows:

• Management and Professional Staff

50% from Ontario universities, balance from other Canadian and non-Canadian universities.

• Graduates for Training Programs

95% from Ontario universities.

• Nuclear Operators

Approximately 10% of OIT level from community colleges.

• Control Technicians

Approximately 90% of the Control Technicians in training.

• Mechanical Maintainers

Approximately 10% learners from community colleges.

• Chemical Operators

Approximately 5% at the trainee operator level.

Prepared by:

Manpower Resourcing Dept.

3. Question

What aspects of training are unique to Hydro?

Answer

Because the question is vague, I will state my assumptions about the question before answering it. First, the reference is to trades training alone, and secondly, that training includes the application of knowledge and skills and not merely the theoretical content.

When Ontario Hydro gets involved in trades training, our goal is to develop skilled trades people to operate and maintain power generation and distribution facilities. While some of the theory related to these training requirements is provided elsewhere in Ontario, application of this knowledge is almost totally unique to Ontario Hydro due to the nature, size and operating characteristics of the equipment involved. It is, however, not just technical uniqueness, but environmental as well; for example, all nuclear people require training in radiation protection.

To our knowledge, no other industry or training institution in Ontario provides application-type training related to our needs. I conclude, therefore, that our training is unique to Ontario Hydro.

As a specific example, a mechanical maintainer in a generating plant looks after maintenance and repair of very large turbines and boilers. There are no turbine and boiler maintenance apprenticeships available in the province.

Prepared by:

Training & Development Dept.

4. Question

What institutions are currently providing skilled manpower for our energy future?

Answer

None as additional training time is required both in acquiring skills and experience on-the-job. If "skilled manpower" is meant to include engineers, the graduates who join us need additional training in training programs of up to two years before they could be called skilled. A small percentage of Management and Professional staff who are hired directly would bring with them skills and experience. This would be acquired in other related utilities or industrial establishments rather than in universities and colleges.

Prepared by:

Manpower Resourcing Dept.

5. Question

Where does Ontario Hydro see a need for improved apprenticeship, diploma and technical courses to meet our energy future?

Answer

With respect to diploma and technical courses, the most obvious improvement area is that community colleges and other training institutions could provide "power" options as part of their curriculum, so that when we recruit technicians and technologists they would already have some of the theories related to the maintenance of power stations. It should be pointed out that this is not just for plant people, but for distribution staff as well; for example, linemen.

As to apprenticeship improvements, we would be very happy if apprenticeships were available in the province for a variety of trades where we need trained personnel. Some examples are - mechanical fitters (heavy industrial rotating equipment) power station electricians and linemen. In other words, the major improvement in the apprenticeship process would be the availability of trained tradesmen in many technical areas so that we would not have to train them ourselves to the degree that we do.

Prepared by:

Training & Development Dept.

MANPOWER REQUIREMENTS

A paper prepared as
background material for the Seminar on
"Energy, Jobs and the Economy"
held by the
Royal Commission on Electric Power Planning
held 5th December 1977
Toronto, Ontario

1.0 Introduction

This report provides forecasts of the manpower required to construct and operate an expanding Ontario Hydro system and discusses some aspects of the necessary training and education programs required to meet such manpower demands.

The basic data has been developed as part of a System Expansion Program Reassessment process and is based on a particular scenario compatible with the current long range generation program forecast LRF-48a.

It should be recognized that the above review process and future construction program revisions will affect these forecasts and that the information provided should be regarded as somewhat tentative at this time.

2.0 Manpower Categories

The basic set of skill and trade categories forecast in this report are displayed in Table 1.

2.1 Construction Manpower

The starting point in projecting construction manpower demand is the historical profile of demand for the various construction projects and activities such as nuclear and fossil-fuelled generating stations, transmission and distribution facilities and heavy water plants. Scaling factors are then used to adjust these historical requirements to different unit and facility sizes.

Manpower profiles for construction of new facilities are superimposed and added cumulatively to generate the demand by skill or trade category shown on Table 2.

2.2 Operating and Maintenance Manpower

The methodology for extrapolating operating and maintenance manpower requirements is similar to that used for construction manpower forecasts.

The forecast of operating and maintenance manpower by skill/trade category and year is shown in Table 3 for nuclear stations and in Table 4 for fossil-fuelled stations.

2.3 Regions and Marketing Manpower

The basis for projections in this area were developed from 1974 through 1977 historical figures showing total staffing for Regions and Marketing by trade category. In addition, available detailed projections up to 1980 have been used.

It has been assumed that the proportionate distribution of staff will remain stable for the time horizon to 2005 and in order to achieve a breakdown into staff categories, it was necessary to aggregate existing trades. This simplistic approach results in the forecasts shown in Table 5.

2.4 Administrative Staff Requirement

An annual growth rate of approximately 3% has been assumed. This sector includes all of the support staff required by Ontario Hydro.

3.0 Overall Manpower Requirements

The summaries shown on Table 6 indicate that the demand for manpower by Ontario Hydro is forecast to double by 1990 from 1975 levels.

The summaries also indicate that by 1990, to meet the expansion program under consideration, construction manpower would triple, operating and maintenance staff would almost triple, there would be a 23 per cent increase in manpower requirements in the Regions and there would be a 75 per cent increase in administration staff requirements.

4.0 The Role of Higher Education Institutions in Ontario

It is expected that fully 95% of graduates entering Ontario Hydro's training program will come from Ontario universities. Of the relatively smaller number of staff appointed from outside to fill vacancies in Management and Professional staff, it is expected that at least 50% will come from Ontario universities, the balance coming from other Canadian and non-Canadian universities.

90% of the Control Technicians in training are expected to come from Ontario colleges. 10% of both mechanical maintainers and nuclear operators and 5% of the trainee chemical operators coming to Ontario Hydro are expected to have continued education to the point of graduation from community colleges.

5.0 Trades Training Requirements Unique to an Electric Utility

An electric utility such as Ontario Hydro develops skilled trades people to operate and maintain its power generation and distribution facilities. While some of the theory related to training requirements is provided elsewhere in Ontario, application of this knowledge is almost totally unique to Ontario Hydro due to the nature, size and operating characteristics of the equipment involved.

Training in radiation protection is also an activity unique to an organization responsible for the operation of nuclear generating facilities.

There are a number of specialized activities in which, to our knowledge, no other industry or training institution in Ontario provides the necessary application-related training as distinct from educational training.

For example, a generating station mechanical maintainer must be trained in the maintenance of very large turbines and boilers and there is no such practical training available in the province outside of Ontario Hydro.

6.0 Potential for Institutional Training of Skilled Manpower

All the education and training institutions in Ontario play a role in educating and training the skilled manpower required to ensure Ontario's energy future. In some specific areas there are opportunities for the institutions to play an even ? greater role than at present.

With respect to diploma and technical courses, the community colleges and other training institutions could provide "power" options as part of their curriculum, graduating technicians and technologists in the theories related to the maintenance of power station or transmission equipment. If such courses included practical apprenticeship training, in-house training activities would be correspondingly reduced.

7.0 Conclusion

Estimates of manpower required to meet the current Ontario Hydro system expansion program are provided. Ontario Hydro believes that existing education and training programs and institutions are capable of providing these requirements.

In addition to the skilled employment opportunities created directly by the construction program referred to, many indirect jobs in supply and service industries would be created and such industries would in turn require skilled and trained personnel. The data in respect of indirect employment is being prepared as part of Ontario Hydro's System Expansion Program Reassessment process currently in progress.

In addition to the above considerations there is the basic implication that if the system expands as forecast a major proportion of the electricity produced would be used in expanded or new manufacturing industries and commercial applications. This will also contribute to the continuing shift to skilled manpower in Ontario society.

TABLE 1

CONSTRUCTION SKILL AND TRADE CATEGORIES

1. Boilermakers
2. Bricklayers
3. Cement Masons
4. Carpenters, Millwrights
5. Electricians
6. Insulators
7. Ironworkers, Rodmen
8. Labourers
9. Operators, Mechanics and Machinists, Firefighters
10. Steam and Pipe Fitters
11. Sheet Metal Workers
12. Teamsters
13. Painters and Glaziers
14. Camp Staff Trades
15. Hydro Staff
16. Engineering Staff
17. Linemen
18. Groundmen

TABLE 2

TOTAL CONSTRUCTION TRADES AND STAFF REQUIREMENTS

	Includes Generating Stations, HWP's & ST & D										
	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Boilermakers	407	425	465	566	510	452	392	466	640	475	399
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Cement Masons	74	56	52	58	55	46	50	93	113	111	111
Carpenters, Millwrights	958	1232	1262	1271	1275	1345	1350	1622	1908	1898	1784
Electricians	1166	1231	1476	1460	1603	1729	1882	1897	1773	2090	2174
Insulators	281	164	156	153	132	147	129	172	131	182	321
Ironworkers, Rodmen	466	537	681	603	601	605	598	755	832	753	776
Labourers	1366	1698	1592	1353	1369	1546	1686	1970	2188	2207	2039
Operators, Mechanics & Machinists, Firefighters ..	589	755	796	683	692	675	737	870	953	1038	1022
Steam & Pipe Fitters	1810	1390	1494	1458	1399	1285	1553	1622	1746	2376	2529
Sheet Metal Workers	127	66	57	77	78	89	81	123	104	96	120
Teamsters	484	707	632	601	655	643	660	863	842	806	936
Painters and Glaziers	111	97	134	140	130	152	145	156	133	191	162
Camp Staff Trades	138	149	156	219	324	456	655	904	987	1013	1094
Hydro Staff	1230	1314	1320	1463	1546	1719	1779	1876	2195	2362	2280
Engineering Staff	2710	3049	3383	3401	2999	3110	3414	4010	4143	4479	440
Linemen	309	429	349	327	400	419	508	500	427	477	566
Groundmen	240	333	272	254	311	326	395	389	332	371	440
TOT	12480	13388	13972	14103	14502	14654	15732	17712	19336	20611	21254

TABLE 2

	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
Boilermakers	516	609	733	602	553	633	782	997	978	831
Bricklayers	24	25	26	29	29	33	33	35	35	37
Cement Masons	78	130	135	129	150	139	130	186	202	175
Carpenters, Millwrights	1828	2119	2560	2286	2364	2416	2551	3120	3104	3174
Electricians	2016	2018	2407	2635	2731	2764	2761	3002	3332	3466
Insulators	213	142	120	214	391	230	173	193	258	549
Ironworkers, Rodmen	825	888	1064	1038	951	1061	1080	1284	1351	1309
Labourers	1997	2305	2867	2768	2649	2583	2828	3478	3693	3480
Operators, Mechanics & Machinists, Firefighters	937	1083	1307	1243	1277	1260	1376	1531	1748	1660
Steam and Pipe Fitters	2191	1934	2215	2962	3077	2723	2576	2915	3761	4140
Sheet Metal Workers	116	140	104	135	180	130	155	171	210	218
Teamsters	900	831	1190	1126	1058	1214	1292	1362	1435	1501
Painters and Glaziers	160	167	197	244	188	228	321	223	306	264
Camp Staff Trades	1334	1566	1574	1495	1694	1865	1893	1904	2119	2288
Hydro Staff	2127	2377	2732	2667	2898	2886	2943	3459	3712	3795
Engineering Staff	4611	4945	5429	5810	6032	6065	6629	6879	7413	7837
Linemen	563	543	693	676	716	778	789	828	857	949
Groundmen	438	422	539	525	556	605	614	644	667	738
TOT	20874	22244	25892	26584	27494	27613	28926	32211	35181	36411

TABLE 3

ADDITIONAL NUCLEAR OPERATING & MAINTENANCE STAFF REQUIREMENTS

TABLE 4

ADDITIONAL THERMAL OPERATING & MAINTENANCE STAFF REQUIREMENTS

Category	1983	1984	1985	1986	1987	1988	1989	1990	1991
Administration	21	34	41	51	61	74	90	102	112
Operating	64	106	128	155	188	228	279	317	347
Mechanical Mtce.	30	50	60	74	89	107	131	150	163
Technical	6	9	11	14	17	20	25	28	31
Chemical	6	9	11	14	17	20	25	28	31
Service Mtce.	42	68	83	101	122	147	180	208	224
Electrical 6									
Instrumentation Mtce.	21	34	41	51	61	74	90	102	112
TOTAL	190	310	375	460	555	670	820	935	1020

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
123	136	153	174	200	216	234	254	270	304	325	352	352
383	422	474	554	619	666	793	783	832	938	1006	1086	1086
180	198	224	261	291	314	340	369	392	442	474	510	510
34	38	42	49	55	58	63	69	73	82	89	96	96
34	38	42	49	55	58	63	69	73	82	89	96	96
248	272	307	359	400	432	468	507	540	608	652	704	704
123	136	153	179	200	216	234	254	270	304	325	352	352
TOTAL	1125	1240	1395	1630	1830	1960	2125	2305	2450	2700	2900	3196

TABLE 5

REGIONS AND MARKETING MANPOWER PROJECTION

<u>Year</u>	<u>Manpower</u>	<u>Year</u>	<u>Manpower</u>
1974	6911	1990	7500
1975	6844	1991	7515
1976	6809	1992	7525
1977	7006	1993	7540
1978	7096	1994	7555
1979	7181	1995	7566
1980	7235	1996	7580
1981	7280	1997	7590
1982	7315	1998	7600
1983	7350	1999	7610
1984	7375	2000	7620
1985	7400	2001	7630
1986	7425	2002	7640
1987	7445	2003	7645
1988	7465	2004	7655
1989	7480	2005	7665

TABLE 6

MANPOWER SUMMARY

	<u>1977</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Construction	10851	14103	19336	25892	32211
O & M	5403	7974	10051	12322	15255
Regions	6159	7235	7400	7500	7566
Administration	6317	7262	8351	9604	11044
TOTAL	28730	36574	45138	55318	66076

Growth as a % of 1977 Manpower 1977 = 100

	<u>1977</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Construction	100	130	178	239	297
O & M	100	148	186	228	282
Regions	100	117	120	122	123
Administration	100	115	132	152	175
TOTAL	100	127	157	193	230

RELATIVE % GROWTH OVER 5 YR. PERIODS

	<u>1977</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Construction	100	30	37	34	24
O & M	100	48	26	23	24
Regions	100	17	02	01	01
Administration	100	15	15	15	15
TOTAL	100	27	23	23	19

Manpower Distribution

	<u>1977</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Construction	38	38	43	47	49
O & M	19	22	22	22	23
Regions	21	20	16	14	11
Administration	22	20	19	17	17
TOTAL	100	100	100	100	100

Revised
November 24, 1977

ENERGY, JOBS AND THE ECONOMY - LABOUR'S VIEWPOINT

DATE: Monday, December 5, 1977

AGENDA: 10:00 A.M. Welcome from Dr. Porter, Chairman
Royal Commission on Electric Power
Planning

10:20 A.M. Keynote Speeches
- Neil Reimer - Canadian Labour Congress
- Clifford Pilkey - Ontario Federation
of Labour

11:30 A.M. Discussion Period

12:30 P.M. Luncheon

1:45 P.M. Discussion Period Continued

4:15 P.M. Closing Remarks

4:30 P.M. Adjournment

PURPOSE: During the course of the Royal Commission hearings, a number of questions have been raised with respect to the planning, recruiting, and training of manpower for Ontario Hydro's generation expansion plan and the effects on employment of possible cutbacks in this plan. Further, questions concerning the impact on the labour market and the economy of alternate energy developments have been raised. Essentially for these reasons, a day seminar has been organized to consider the various points of view and perspectives on the broad subject of "Energy, Jobs and the Economy - Labour's Viewpoint."

To initiate discussion, the Royal Commission on Electric Power Planning has invited representatives from the Canadian Labour Congress and the Ontario Federation of Labour to present keynote papers.

The Standing Committee on Energy Policy of The Canadian Labour Congress has the responsibility for researching and articulating energy policy resolutions on behalf of affiliated unions to the CLC. The Ontario Federation of Labour has a similar committee, "Conservation and Pollution Control Committee," which examines questions and issues in the energy field.

RESOURCE MATERIAL: Three studies have been prepared by the research staff of the Royal Commission:

- i) "Energy, Jobs and the Economy"
- ii) "Energy Planning - Labour's Viewpoint"
- iii) "Manpower Forecasting and Training - Participants in Ontario."

These papers, along with the keynote addresses by the labour unions, will be mailed to participants prior to the seminar.

PARTICIPANTS

I. Canadian Labour Congress: Standing Committee on Energy Policy

1. Ms. Shirley Carr - Vice President,
Canadian Labour Congress,
2841 Riverside Drive,
Ottawa, Ontario.
2. Mr. Neil Reimer - Canadian Director,
Oil, Chemical and Atomic
Workers' International Union,
District 6,
300 - 10603 - 100 Avenue,
Edmonton, Alberta.
3. Mr. Gordon Milling - Research Director,
United Steelworkers of America,
55 Eglinton Avenue East,
Toronto, Ontario.
4. Mr. Stanley Grocott - International Representative,
United Mine Workers,
401 - 224 9th Avenue S.W.,
Calgary, Alberta.
5. Mr. William Vincer - President,
Local 1000,
Ontario Hydro Employees Union,
244 Eglinton Avenue East,
Toronto, Ontario.
6. Mr. L. LeClerc - International Union of
Operating Engineers,
Edmonton, Alberta
7. Mr. B. Philp - International Representative
Oil, Chemical and Atomic
Workers' International Union,
5555 East Hastings,
Burnaby, B.C.

I. Canadian Labour Congress cont.

8. Mr. Douglas Forgie - Director, Labourers' International of North America, 301 - 151 Slater Street, Ottawa, Ontario.
9. Mr. E.A. Mitchell - Executive Secretary, Alberta Federation of Labour, 306 - 11010 142nd Street, Edmonton, Alberta.
10. Mr. Emile Vallee - United Steelworkers of America, 55 Eglinton Avenue East, Toronto, M4P 1B5.
11. Mr. Dennis McDermott - United Automobile, Aerospace and Agricultural Implement Workers of America, International Vice President and Director for Canada, Local 200 - 444 Hall, Windsor, Ontario.
12. Mr. K.G. Rose - International Brotherhood of Electrical Workers, International Vice President, Suite 401, 45 Sheppard Avenue East, Willowdale, Ontario, M2N 5W9.
13. Mr. Mike Rygus - International Association of Machinists and Aerospace Workers, 287 MacLaren Street, Suite 400, Ottawa, Ontario, K2P 0L9.
14. Mr. Seppo Nousiainen - Assistant Director to the Research and Legislation Dept., 2841 Riverside Drive, Ottawa, Ontario, K1V 8X7.

II. Ontario Federation of Labour:

1. Mr. Cliff Pilkey - President,
Ontario Federation of Labour,
15 Gervais Drive,
Suite 408,
Don Mills, Ontario.
2. Mr. John Eleen - Research Department,
Ontario Federation of Labour,
15 Gervais Drive,
Suite 408,
Don Mills, Ontario.
3. Mr. R. Brixhe - Vice President,
116 Albert St.,
Suite 304,
Ottawa K1P 5G3.
4. Mr. H. Buchanan - Vice President,
15 Gervais Drive,
Suite 310,
Don Mills, M3C 1Y8.
5. Mr. B. Clark - Vice President,
15 Gervais Drive,
Suite 204,
Don Mills, M3C 1Y8.
6. Mr. J. Donnelly - Vice President,
Suite 507,
Don Mills, M3C 1Y8.
7. Mr. A. Hershkovitz - Vice President,
33 Cecil Street,
Toronto, M5T 1N1.
8. Mr. G. Pattinson - Vice President,
15 Gervais Drive,
Don Mills, M3C 1Y8.
9. Mr. W. Punnett - Vice President,
2249 Yonge Street,
Suite 301,
Toronto, M4S 2B1.
10. Mr. A. Riseley - Vice President,
15 Gervais Drive,
Suite 503,
Don Mills, M3C 1Y8.

II. Ontario Federation of Labour cont.

11. Mr. T. Roscoe - Vice President,
67 Yonge Street,
14th Floor,
Toronto, M5E 1J8.
12. Ms. E. Ryan - Vice President,
2 - 124 Fourth Avenue,
Ottawa, K1S 2L4.
13. Mr. P.G. Sagriff - Vice President,
18 Princess Ave.,
St. Thomas, Ontario.
14. Mr. G. Wilson - Vice President,
205 Placer Court,
Willowdale, M2H 3H9.

III. Government Representatives:

A. Committees:

1. Mr. John Kinley,
Executive Co-ordinator,
Ontario Manpower Co-ordinating Committee,
Ministry of Labour,
434 University Avenue,
Toronto, Ontario.
2. Mr. W. Cameron,
Chairman,
Labour Market Information Committee,
Ontario Manpower Co-ordinating Committee,
Ministry of Labour,
434 University Avenue,
Toronto, Ontario.

B: Ministries:

i) Ministry of Labour:

1. Dr. Farid Siddiqui,
Chief Economist,
Manpower and Employment Opportunities,
Research Branch,
11th Floor,
400 University Avenue,
Toronto, Ontario.

B: Ministries cont.

ii) Ministry of Industry and Tourism:

1. Mr. Bill Ledingham,
Senior Policy Advisor,
Policy Development and Co-ordination Branch,
8th Floor, Hearst Block,
Queen's Park, Toronto.
2. Mr. E. Robertson,
Senior Policy Advisor,
5th Floor, Hearst Block,
Queen's Park, Toronto.
3. Mr. James S. Carrick,
Manager,
Small Business Operations Division,
Selective Placement Division,
6th Floor, Hearst Block,
Queen's Park, Toronto.

iii) Ministry of Colleges and Universities:

1. Mr. Ben Wilson,
Assistant Deputy Minister,
The University Affairs Branch,
5th Floor, Mowat Block,
Queen's Park, Toronto.
2. Mr. T.P. Adams,
Assistant Deputy Minister,
Affairs and Manpower Training Division,
Queen's Park, Toronto.
3. Mr. H. Noble,
Director,
Programme Resources Branch,
10th Floor, Mowat Block,
Queen's Park, Toronto.
4. Mr. E.L. Kerridge,
Director,
College Affairs Branch,
9th Floor, Mowat Block,
Queen's Park, Toronto.
5. Dr. W. Winegard,
Vice Chairman,
Ontario Council on University Affairs,
2nd Floor,
801 Bay Street,
Toronto.
6. Mr. Ken Coupland,
Programme Resources Branch,
9th Floor, Mowat Block,
Queen's Park, Toronto.

B: Ministries cont.

iii) Ministry of Colleges and Universities cont.

7. Mr. W.F. Davy,
Director,
Industrial Training Branch,
Manpower Training and College Affairs Division,
900 Bay Street,
10th Floor, Mowat Block,
Queen's Park, Toronto.
8. Mr. D.N. Omand,
Chairman,
Industrial Training Council,
801 Bay Street,
Toronto, Ontario,
M5S 1Z1.

iv) Ministry of Treasury, Economics and
Intergovernmental Affairs

1. Dr. Cliff Jutlah,
Senior Economist,
Economic Policy Branch,
3rd Floor, Frost Building North,
Queen's Park, Toronto.
2. Mr. D.E. Redgrave,
Executive Director,
Office of Economic Policy,
3rd Floor, Frost Building North,
Queen's Park, Toronto.

v) Ministry of Energy:

1. Mr. Malcolm Rowan,
Deputy Minister,
12th Floor,
56 Wellesley Street West,
Sunoco Building,
Toronto.
2. Miss Cathy Patterson,
12th Floor,
56 Wellesley Street West,
Sunoco Building,
Toronto.

C: Provincial Secretariats:

i) Secretariat for Resources Development:

1. Mr. Richard M. Dillon,
Deputy Provincial Secretary,
Room 108, Legislative Building,
Queen's Park, Toronto.

D: Federal Government Departments:

i) Department of Energy, Mines and Resources:

1. Dr. Donald Strange,
Economic Advisor,
Renewable Energy Resources Branch,
580 Booth Street,
17th Floor,
Ottawa, K1A 0E4
2. Dr. J. Gander,
Director General,
Energy Research Group,
588 Booth Street,
3rd Floor,
Ottawa, Canada.

ii) Employment and Immigration Canada:

1. Mr. W.J. Fox,
Director-General,
Labour Market and Benefits Programme,
Ontario Region,
2180 Yonge Street,
18th Floor,
Toronto, Ontario.

IV. Ontario Hydro Representatives:

1. Dr. David Drinkwalter,
Office of the Chief Economist,
Administrative Department,
19 - G1,
700 University Avenue,
Toronto, Ontario.

IV. Ontario Hydro cont.

2. Mr. R.H. Nicholson,
Director of Manpower Resources,
Manpower Resource and Development Division,
2nd Floor, A - 14,
700 University Avenue,
Toronto, Ontario.
3. Mr. Eldon Horton,
Operations Manager,
Bruce Nuclear Power Development,
Box 1540,
Tiverton, Ontario,
NOG 2T0.
4. Mr. George Mackie,
Manager of Construction,
17 - A4,
700 University Avenue,
Toronto, Ontario,
M5G 1Z5.
5. Ms. Sylvana Guindon,
Public Hearings Analyst,
Rate and System Expansion Hearings,
700 University Avenue,
Toronto, Ontario,
M5G 1Z5.
6. Mr. J.E. (Ian) Wilson,
Public Hearings Officer,
Rate and System Expansion Hearings,
700 University Avenue,
Toronto, Ontario,
M5G 1Z5.

V. Special Interest Public Sector Representatives:

A: Canadian Manufacturers Association :

1. Mr. Doug Porter,
Manager, Special Projects,
Steel Company of Canada Ltd.,
P.O. Box 205,
Toronto Dominion Centre,
Toronto M5K 1J4.

B: Canadian Federation of Independent Business:

1. Mr. John Bulloch,
15 Coldwater,
Toronto, Ontario.

C: Ontario Economic Council:

1. Dr. Grant Reuber,
Chairman,
81 Wellesley Street East,
Toronto, Ontario,
M4Y 1H6.

D: Colleges of Applied Arts and Technology:

i) Algonquin College:

1. Mr. R.J. Talbot,
Office of the Dean,
1385 Woodroffe Ave.,
Ottawa, K2G 1V8.

ii) Humber College:

1. Mr. A. Pickard,
Dean of Technology,
56 Queen Elizabeth Blvd.,
Toronto, M8Z 1M1.

iii) Ryerson Polytechnical Institute:

1. Mr. H. Burkhardt,
Acting Director,
Ryerson Energy Centre,
380 Victoria Street,
Room 1217,
Toronto, Ontario

D: Colleges of Applied Arts and Technology cont.

iv) Sir Sanford Fleming

1. Mr. J.D. (Ian) Steele,
Co-ordinator of the Electro-Mechanical
Technology Programme,
Brealey Campus,
Peterborough, Ontario,
K9J 7B1.

E: Canadian Coalition for Nuclear Responsibility:

1. Mr. Ian Connerty,
373 Roosevelt Avenue,
Ottawa, Ontario,
K2P 1Y9.

F: Need Committee for the North Channel:

1. Mr. Ralph Thomas,
51 Idaho Drive,
Sault Ste Marie, Ontario,
P6A 4X8.

G: Christian Farmers Federation of Ontario:

1. Mr. E. van Donkersgoed,
Box 70,
Drayton, Ontario,
NOG 1P0.

H: Electrical and Electronic Manufacturers Association
of Canada:

1. Mr. David Armour,
1 Yonge Street,
Suite 1608,
Toronto, M5E 1E5.
2. Mr. George Vaughn,
Canadian General Electric,
19 Eglinton Avenue East,
Scarborough, Ontario,
M1L 2M1.

I: Public Interest Coalition for Energy Planning:

1. Ms. Gail Randall,
801 Bay Street,
3rd Floor,
Toronto, M5S 1Y9.

J: Conservation Council of Ontario:

1. Mr. Arthur Timms,
45 Charles Street East,
6th Floor,
Toronto, M4Y 1S2.

K: Consumers' Association of Canada:

1. Mr. John Wilson,
Room 203,
27 Carlton Street,
Toronto, M5B 1L2.

L: Energy Probe:

1. Mr. Chris Conway,
43 Queen's Park Cres. East,
Toronto, M5S 2C3.

M: Ontario Federation of Agriculture:

1. Mr. H. Patterson,
580 Christie Street,
Apt. 1209,
Toronto, M6G 3E3.

N: Sierra Club of Ontario:

1. Ms. Terry Bisset,
47 Colborne Street,
Toronto, M5E 1E3.

O: Atomic Energy of Canada Limited:

1. Mr. H.E. (Ted) Thexton,
275 Slater Street,
20th Floor,
Ottawa, K1A 0S4.

P: Labour Council of Metropolitan Toronto:

1. Ms. Rita Tate,
2121 Bathurst Street,
Apt. #1017,
Toronto, M5N 2P3.

Q: Zero Population Growth of Canada, Incorporated:

1. Mr. Chris Taylor
255 Brunswick Avenue,
Toronto, M5S 2M6.

R: People Against Nuclear Development Anywhere:

1. Mr. W. Borger,
R.R. #1,
Brockville, Ontario,
K6V 5T1.

S: Canadian Nuclear Association:

1. Mr. Jim Weller,
65 Queen Street West,
Toronto, M5H 2M5.

T: Ontario Coalition for Nuclear Responsibility:

1. Mr. Paul Carroll,
131 Goderich Street,
Seaforth, Ontario.

U: Science Council:

1. Dr. Ursula Franklin,
Department of Metallurgy and Materials Science,
University of Toronto,
184 College Street,
Toronto, M5S 1G4.

V: Union of Ontario Indians:

1. Mr. Paul Williams,
Director,
Rights and Treaty Research,
3028 Danforth Avenue,
Toronto, Ontario,
M4C 1N2.

W: Federation for Engineering and Scientific Association:

1. Mr. Allan Brookes,
Vice President,
171 College Street,
Toronto, Ontario.
- i) Society of Ontario Hydro Managerial and Professional Staff
- ii) Society for Professional Engineers and Associates

X: Interested Individuals:

1. Mr. George Meek,
137 Albany Avenue,
Toronto, M5R 3C5.

